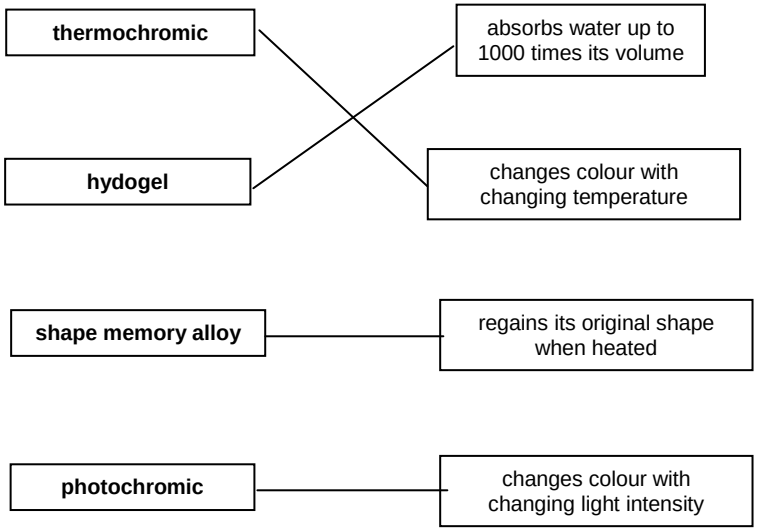
Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
1		*(a)*	(i)		1	lakes / rivers / streams / aquifers / groundwater		surface water / rain / wells / springs	seawater sewers
			(ii)		1	1	sedimentation		
			(iii)		1	chlorination			
		(b)			1	stop washing cars/ windows stop watering gardens/ using a hose pipe don't run water when washing teeth/ low flush toilets/ dual flush toilets/ only run washing machine once a week/ only run washing machine with a full load/ shower instead of bath use waste water to flush toilets / clean car		don't wash don't use water collect rainwater use bottled water	

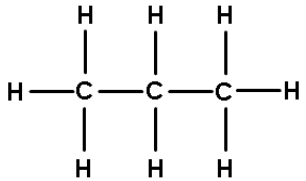
Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
2					3	 all correct for 3 marks any two correct for 2 marks, any 1 correct for 1			

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
3		*(a)*	(i)		2	A and B both needed (1) little / poor / no lather (1) second mark alone may be awarded if only A *or* B given			
			(ii)		2	A is temporary hard water and B is permanent (1) any of following for (1) • temporary is softened by boiling • permanent is not softened by boiling • temporary forms lather after boiling • permanent doesn't form lather after boiling		ignore reference to sample C unless incorrect	

Question Number		Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT								
		(b)	(i)		3	• salt remains in flask / salt left behind • water boils / water turns to steam / steam enters condenser • steam condenses / steam turns back to water in condenser / steam cools to form water • distillation / desalination any 3 for (1) each maximum (1) for description of separation of ethanol and water			
			(ii)		2	a lot of lather / froth / bubbles / foam (1) (pure water) contains no dissolved solids / (pure water) contains no Ca^{2+} / (pure water) contains no Mg^{2+} (1)	accept diagram reference to calcium / magnesium		

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
4		*(a)*			1	purple and yellow both needed			
		(b)			2	0.4 × 10 (1) 4 (1) award (2) for correct answer only (cao) no error carried forward (ecf)			
		(c)			1	(food colourings are) soluble (in water) / (food colouring) dissolve (in water)			

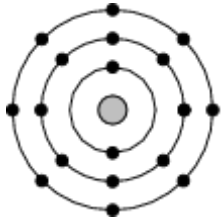
Question Number					Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT	Sub-section							
5		*(a)*			1	value in the range 19–20			
		(b)			1	line right of original graph from (0,90) to (35,30) – tolerance of 1 small square			
		(c)			2	precipitate formed/insoluble substance formed (1) light cannot travel through/ stops light / blocks light (1)	goes cloudy/ milky		
		(d)			1	any of following (apparatus) not light tight / light can get in around tube precipitate formed not dense enough / thick enough / precipitate formed does not block all the light		light all around / light present	

Question Number					Mark	Answer	Accept	Neutral answer	Do not accept
FT	HT	Sub-section							
6		*(a)*			1	C_3H_6		CH_2CHCH_3	
		(b)			1				
		(c)			3	• double bond opens (1) R • ethene molecules join together • long chain / single chain formed / polymer formed • addition reaction/ addition polymerisation any two for (1) each		becomes single bond loses double bond 'additional'	

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7		*(a)*	(i)		1	sodium atom 1 chlorine atom 7 both needed			
			(ii)	I	2	sodium (atom) loses one electron (1) chlorine (atom) gains one electron (1) award (2) for electron transferred from sodium to chlorine maximum (1) if transfer of more than 1 electron implied			
				II	1	sodium chloride / NaCl			
		(b)			2	23 + 35.5 + 3(16) (1) 106.5 (1) award (2) for cao no ecf			

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
8	1	*(a)*			3	two possible approaches either • below 54°C, NaCl more soluble (1) • at 54°C, solubilities the same (1) • above 54°C, $CuSO_4$ more soluble (1) or • below 54°C, $CuSO_4$ increases a lot with temperature, NaCl does not (1) • above 54°C, trend continues but $CuSO_4$ is more soluble than NaCl (1) • at 54°C, solubilities the same (1)	converse converse		
		(b)			2	56 – 29 = 27 (1) no tolerance 27/2 = 13.5 (1) ecf possible award (2) for cao			

Question Number								
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
		(c)			2	water freezes at 0°C / is ice at 0°C / is solid at 0°C / 0°C is the freezing point of water (1) water boils at 100°C / is steam at 100°C / is a gas at 100°C / 100°C is the boiling point of water (1)	these are the freezing point and boiling point of water (2) these are the fixed points of water (2) water is only liquid between these two temperatures (2) water is liquid between these temperatures (1)	melting point	

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
9	2	*(a)*	(i)		5	symbol protons neutrons electrons fluorine 10 9 calcium $^{40}_{20}Ca$ 20 argon 18 (1) for each correct answer			
			(ii)		1	calcium/Ca and argon /Ar both needed			
			(iii)		1			2,8,8	
		(b)			2	Similarity: (same) number of protons (1) Difference: (different) number of neutrons (1)	p for proton n for neutron	reference to atomic number and mass number	reference to electrons

Question Number				
FT	HT		Mark	Answer
9	3	*(a)*	6 QWC	Indicative content • all three metals float, move about the water surface and produce bubbles • lithium reacts slowly without melting • sodium reacts quickly forming a sphere • potassium reacts violently forming a sphere and burning with a lilac flame • reactivity increases down the group *word /symbol equations not expected but creditworthy* 5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. 3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. 1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. 0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.
		(b)	2	Na_2O (1) correctly balanced (1) formula must be correct before balancing mark can be awarded